STRATEGY FOR RECOVERY

A core area represents the closest approximation of a biologically functioning unit. The combination of core habitat (*i.e.*, habitat that could supply all the necessary elements for the long-term security of bull trout including both spawning and rearing as well as foraging, migrating, and overwintering) and a core population (*i.e.*, bull trout inhabiting a core habitat) constitutes the basic core area upon which to gauge recovery within a recovery unit. Within a core area, many local populations may exist.

Bull trout are currently distributed among three recovery subunits in the Southwest Idaho Recovery Unit, with individuals occurring in Boise River, Payette River, and Weiser River basins (Figure 2). In the Boise River Recovery Subunit, bull trout occur in three core areas in the basin upstream of Lucky Peak Dam (Table 4; Figure 2). The Arrowrock Core Area includes the Boise River watersheds upstream of Arrowrock Dam, including the North Fork Boise River, Middle Fork Boise River, and South Fork Boise River downstream of Anderson Ranch Dam (Figure 3). The Anderson Ranch Core Area includes the South Fork Boise River watershed upstream of Anderson Ranch Dam (Figure 4). The Lucky Peak Core Area includes Lucky Peak Reservoir and tributaries entering it, namely the Mores Creek watershed (Figure 5). Migratory and resident bull trout occur in both the Arrowrock and Anderson Ranch core areas. In the Lucky Peak Core Area, resident bull trout occur in the headwaters of Mores Creek and migratory bull trout occur in Lucky Peak Reservoir. It is not known whether all migratory bull trout in Lucky Peak Reservoir have been entrained from the Arrowrock Core Area, or whether some fish may be produced in the Mores Creek watershed. Within the Mores Creek drainage, it is uncertain whether the Grimes Creek watershed contains potential spawning and rearing habitat because it has not been intensively surveyed specifically for bull trout. Investigating the presence of bull trout and the suitability of the watershed for bull trout spawning and rearing is a research need.

In the Payette River Recovery Subunit, bull trout occur in five core areas throughout the basin (Table 4; Figure 6): 1) the upper South Fork Payette River core area includes watersheds upstream of Big Falls, including the Deadwood River drainage downstream of Deadwood Dam (Figure 7); 2) the Deadwood River Core Area includes watersheds in the Deadwood River drainage upstream of Deadwood Dam (Figure 8); 3) the Middle Fork Payette River Core Area includes the watersheds upstream from the confluence with the South Fork Payette River (Figure 9); 4) the North Fork Payette River Core Area includes the watershed upstream of Cascade Dam (Figure 10); and 5) the Squaw Creek Core Area includes watersheds in Squaw Creek upstream from its confluence with the Payette River

(Figure 11). Bull trout in these core areas are primarily resident fish, with relatively low numbers of migratory fish.

In the Weiser River Recovery Subunit, bull trout occur in a single core area (Table 4; Figure 12), which includes watersheds upstream of and including the Little Weiser River watershed. The current distribution of bull trout in the recovery unit includes the Little Weiser River, East Fork Weiser River, and the Hornet Creek drainages (Figure 13). Bull trout in the Weiser River Core Area are thought to consist only of resident fish.

Table 4. Recovery subunits, core areas, local populations, and currently unoccupied potential spawning and rearing habitat in the Southwest Idaho Recovery Unit, Idaho.

Recovery subunit	Core area	Local populations	Potential spawning and rearing habitat[1]
Boise River	Arrowrock	1. Upper Crooked River 2. Bear River (including Bear Creek) 3. Lodgepole Creek 4. Upper North Fork Boise River (McLeod and McPhearson creeks) 5. Big Silver Creek 6. Ballentyne Creek 7. Johnson Creek 8. Roaring River 9. Buck Creek 10. Blackwarrior Creek 11. Steel Creek 12. Queens River (including Little Queens River) 13. Yuba River 14. Sheep Creek 15. Rattlesnake Creek	upper Smith Creek, Cottonwood Creek, Logging Creek, Haga Creek, Meadow Creek, French Creek, Lost Man Creek, Swanholm Creek, Hot Creek, Bald Mountain Creek, Eagle Creek, Joe Daley Creek, Leggitt Creek, upper Middle Fork Boise River, Pikes Creek, Beaver Creek, Edna Creek, Big Owl Creek, Wren Creek, Trapper Creek, Trail Creek, Taylor Creek
Boise River	Anderson Ranch	1. Dog Creek 2. Willow Creek 3. Elk Creek 4. Big Water Gulch 5. Beaver Creek 6. Boardman Creek 7. Salt Creek 8. Skeleton Creek 9. Bear Creek 10. Ross Fork Creek 11. Johnson Creek 12. Emma Creek 13. Big Smokey Creek (including West Fork Big Smokey Creek) 14. Little Smokey Creek 15. Smokey Dome Canyon	Basalt Creek, Backhorse Creek, Redrock Creek, Carrie Creek, Grindstone Creek, Warwick Creek, Big Peak Creek, North Fork Big Smokey Creek, Skunk Creek, Feather River, Trinity Creek, Grouse Creek, Deer Creek, Fall Creek, North Fork Lime Creek, Middle Fork Lime Creek, South Fork Lime Creek, Hunter Creek, Maxfield Creek
Boise River	Lucky Peak	1. Mores Creek	Grimes Creek[2]

Table 4. Recovery subunits, core areas, local populations, and currently unoccupied potential spawning and rearing habitat in the Southwest Idaho Recovery Unit, Idaho.

Recovery subunit	Core area	Local populations	Potential spawning and rearing habitat[1]
Payette River	Upper South Fork Payette River	1. Scott Creek 2. Whitehawk Creek 3. Clear Creek 4. Eightmile Creek 5. Wapiti Creek 6. Canyon Creek 7. Upper South Fork Payette River 8. Tenmile Creek 9. Chapman Creek	Warm Springs Creek, Fivemile Creek, Rock Creek
Payette River	Deadwood River	1. Trail Creek 2. Beaver Creek 3. Wildbuck Creek 4. Upper Deadwood River 5. Deer Creek	South Fork Beaver Creek, Habit Creek, Basin Creek, Goat Creek, Bitter Creek, East Fork Deadwood River, Stratton Creek
Payette River	Middle Fork Payette River	1. Upper Middle Fork Payette River (drainage upstream of and including Bull Creek and Sixteen-to-One Creek)	Silver Creek, Lightning Creek, Sixmile Creek, West Fork Creek, Wet Foot Creek
Payette River	North Fork Payette River	1. Gold Fork River	Kennally Creek, Lake Fork, North Fork Lake Fork, South Fork Lake Fork, Fisher Creek, upper North Fork Payette River
Payette River	Squaw Creek	1. Squaw Creek 2. Third Fork Squaw Creek	Second Fork Squaw Creek, Sagehen Creek, Pine Creek
Weiser River	Weiser River	1. Upper Hornet Creek 2. East Fork Weiser River 3. Upper Little Weiser River 4. Anderson Creek 5. Sheep Creek	Pine Creek, Rush Creek, Goodrich Creek, Johnson Creek, West Fork Weiser River, Lost Creek, upper Weiser River

[1] Potential spawning and rearing habitat are areas that are presently unoccupied or where the status of bull trout is unknown, but that may be able to provide spawning and rearing habitat for bull trout. Listed streams are based on discussions with the recovery unit team, bull trout observations, and adjunct habitat (*i.e.,* areas not presently supporting bull trout spawning and rearing, but most likely to support spawning and rearing if restored) identified in bull trout problem assessments (Jimenez and Zaroban 1998; Steed *et al.* 1998; Steed 1999; DuPont and Kennedy 2000).

[2] It is uncertain whether the Grimes Creek watershed contains potential spawning and rearing habitat. Investigating the presence of bull trout and the suitability of the watershed for bull trout spawning and rearing is a research need.

Figure 2. Boise River Recovery Subunit showing the locations of the Arrowrock, Anderson Ranch, and Lucky Peak core areas (see Table 4).

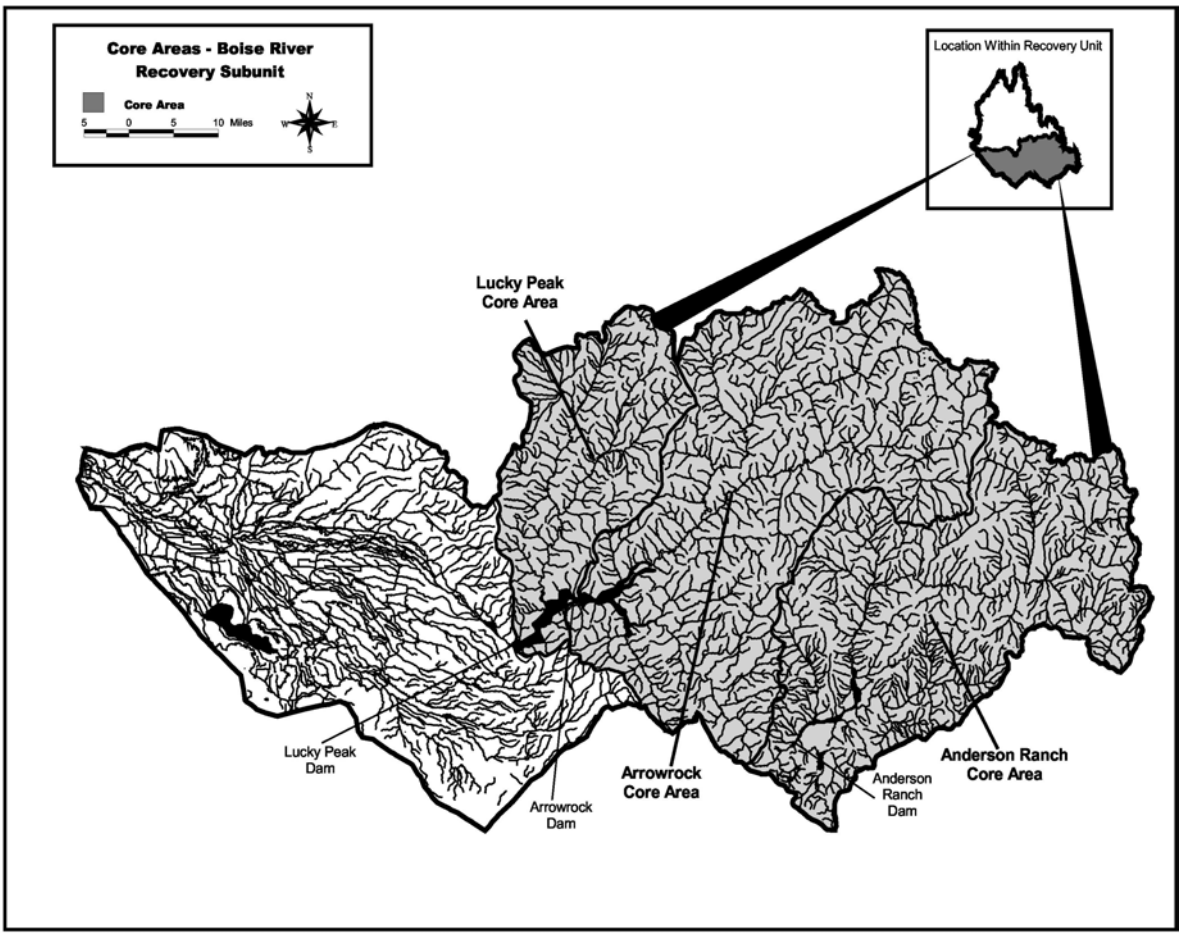


Figure 3. Arrowrock Core Area (Boise River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

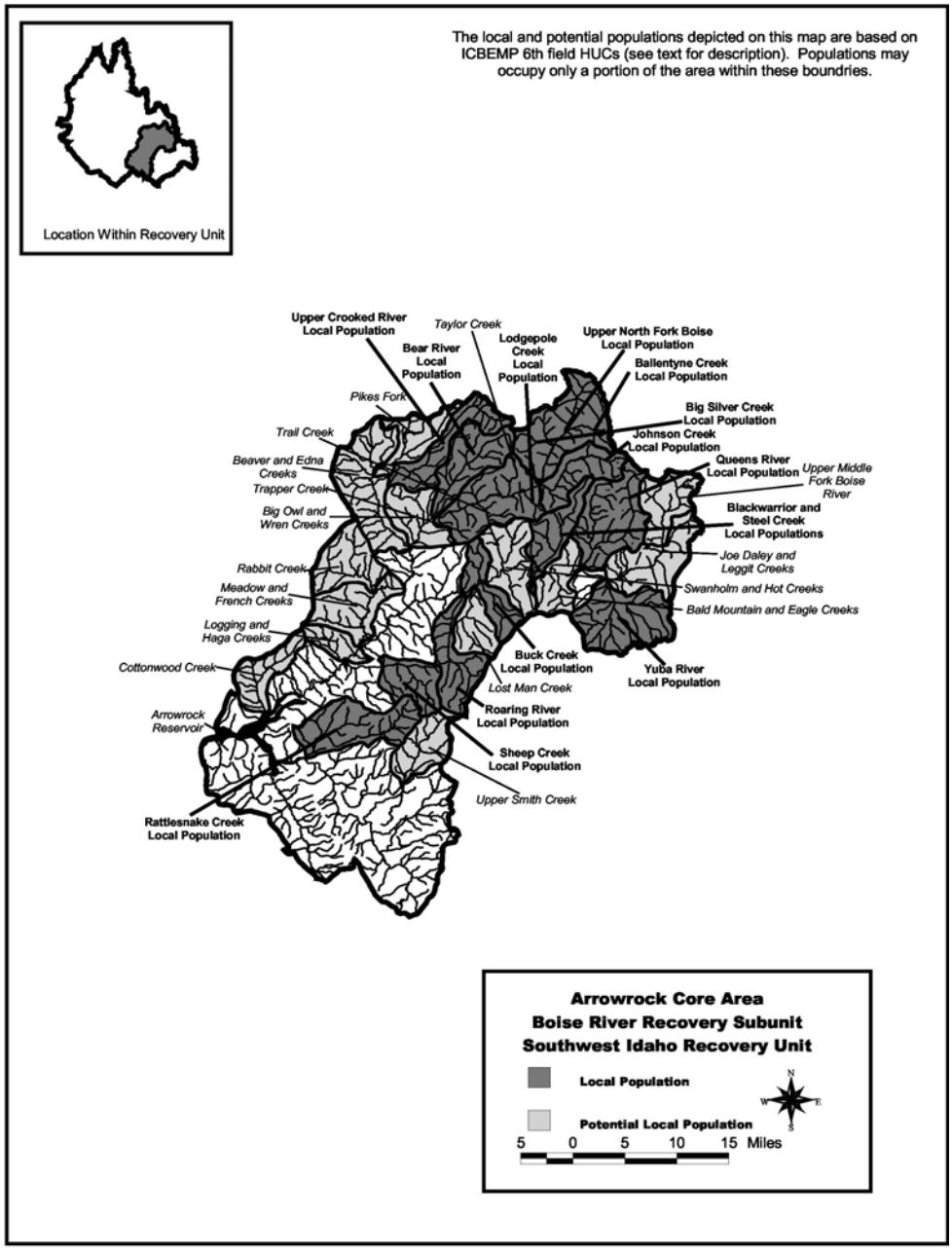


Figure 4. Anderson Ranch Core Area (Boise River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

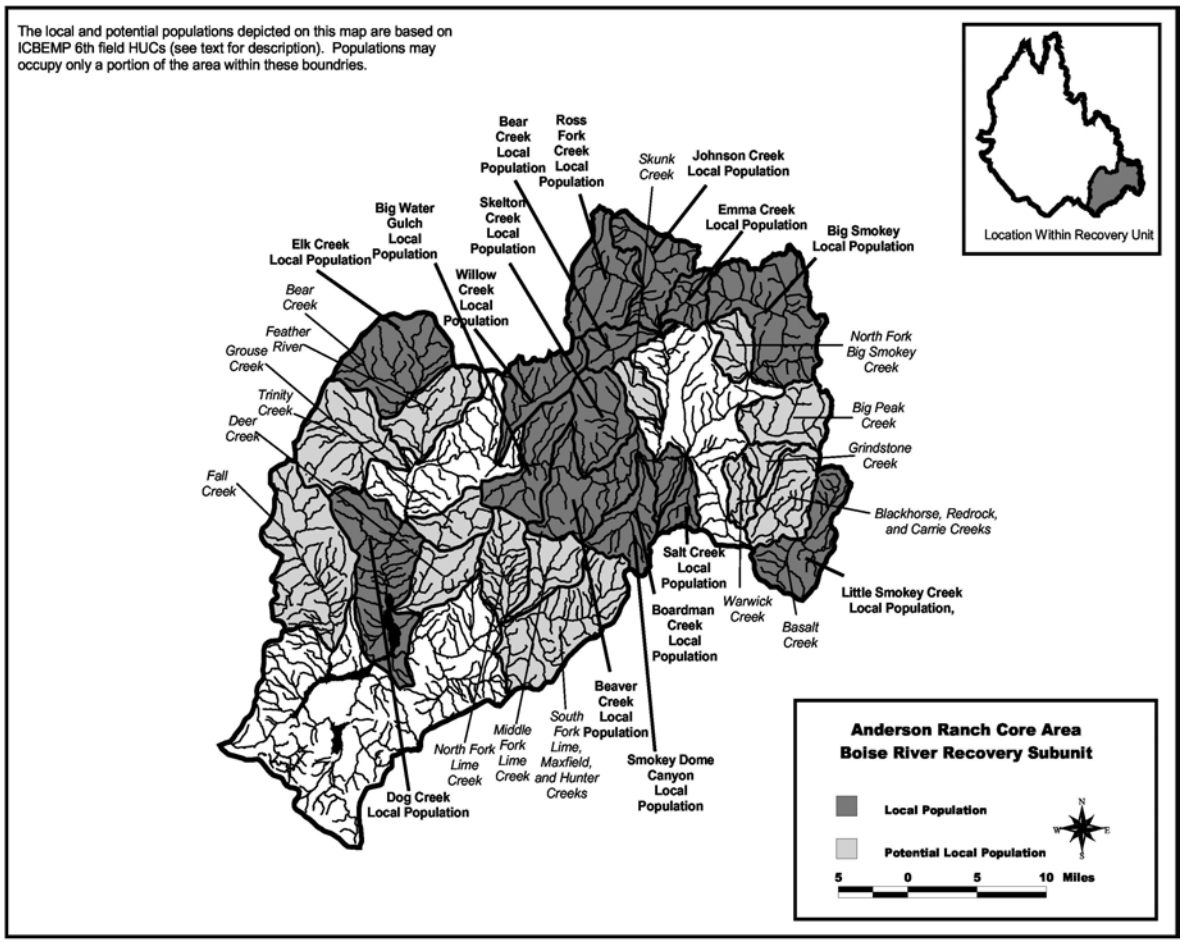


Figure 5. Lucky Peak Core Area (Boise River Recovery Subunit) showing the location of the local population (see Table 4).

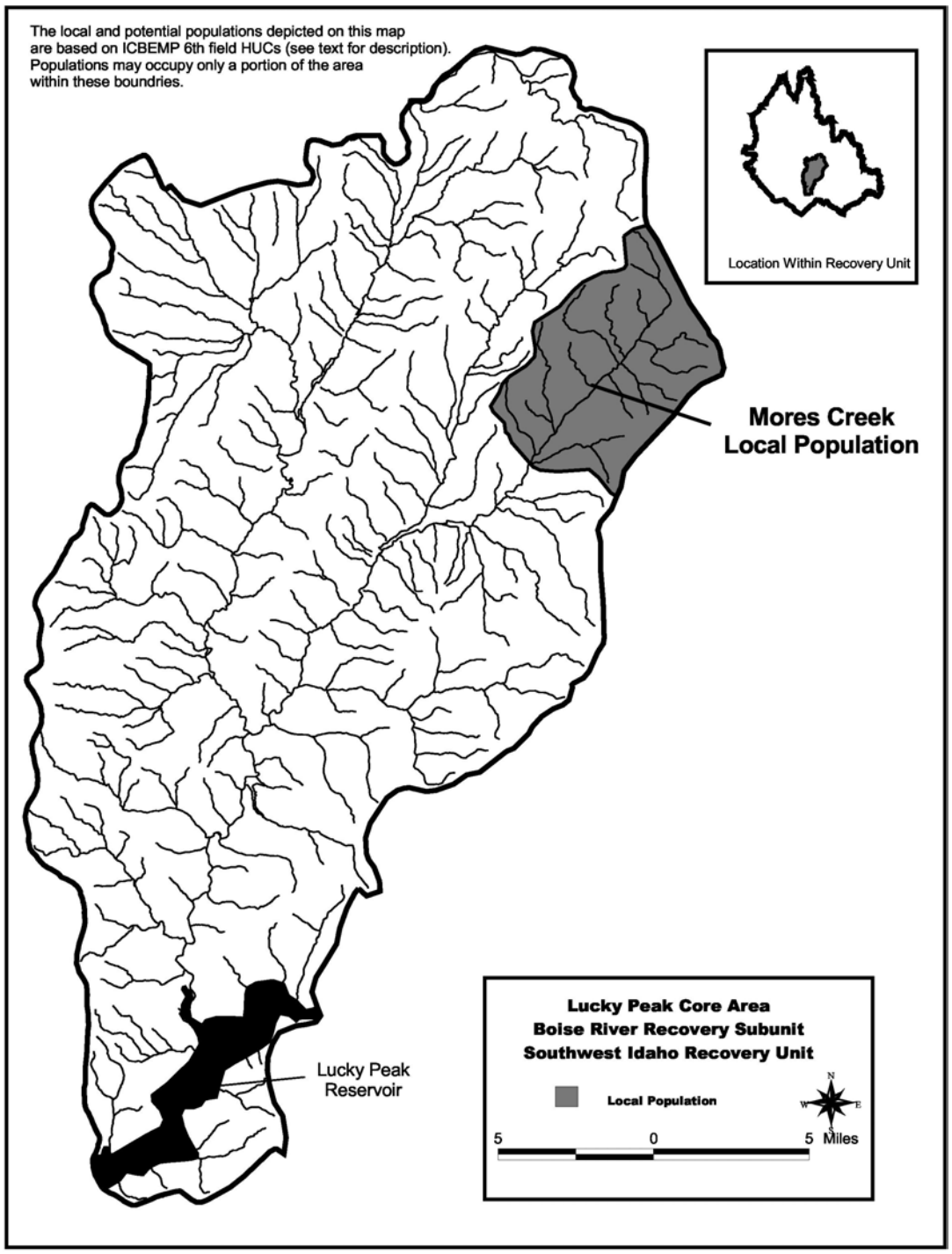


Figure 6. Payette River Recovery Subunit showing the locations of the upper South Fork Payette River, Deadwood River, Middle Fork Payette River, North Fork Payette River, and Squaw Creek core areas (see Table 6).

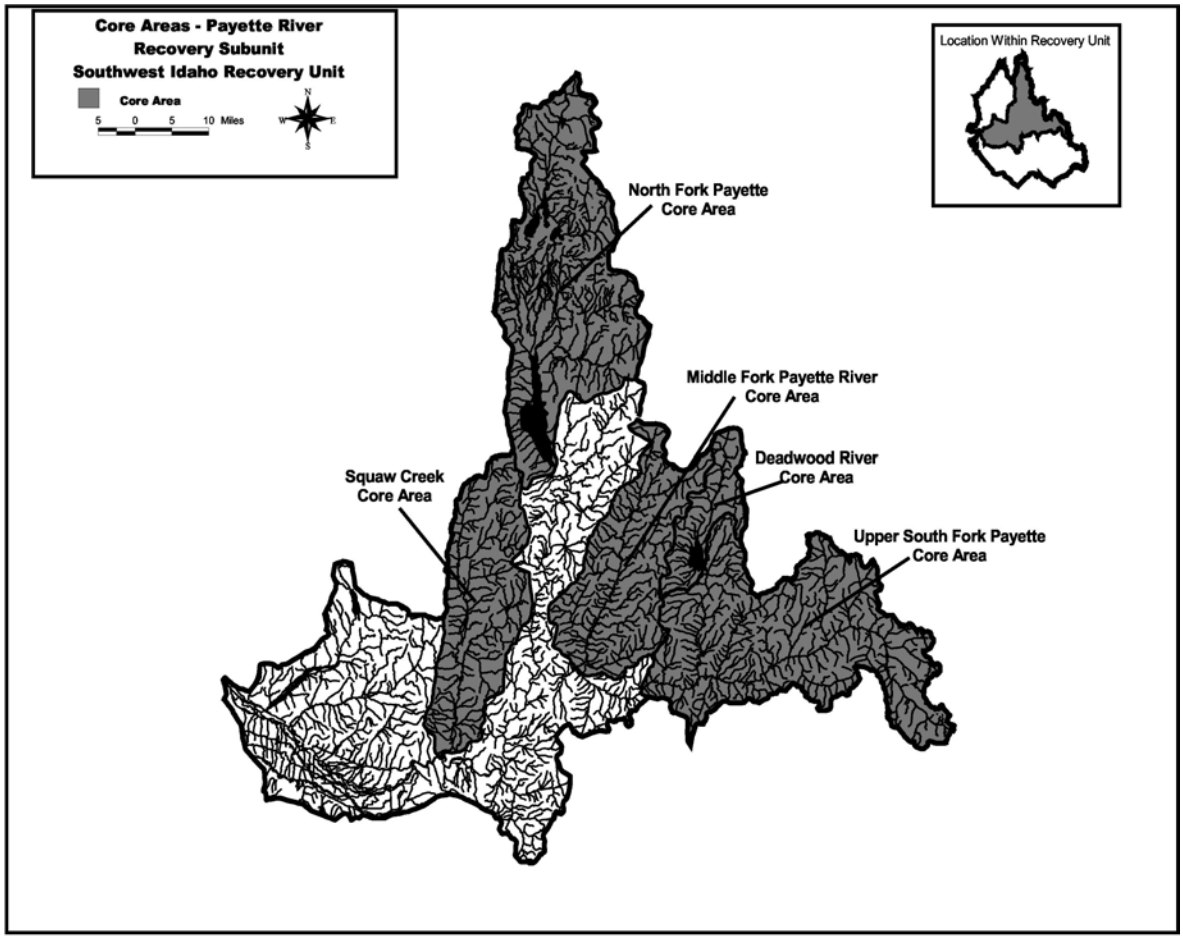


Figure 7. Upper South Fork Payette River Core Area (Payette River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

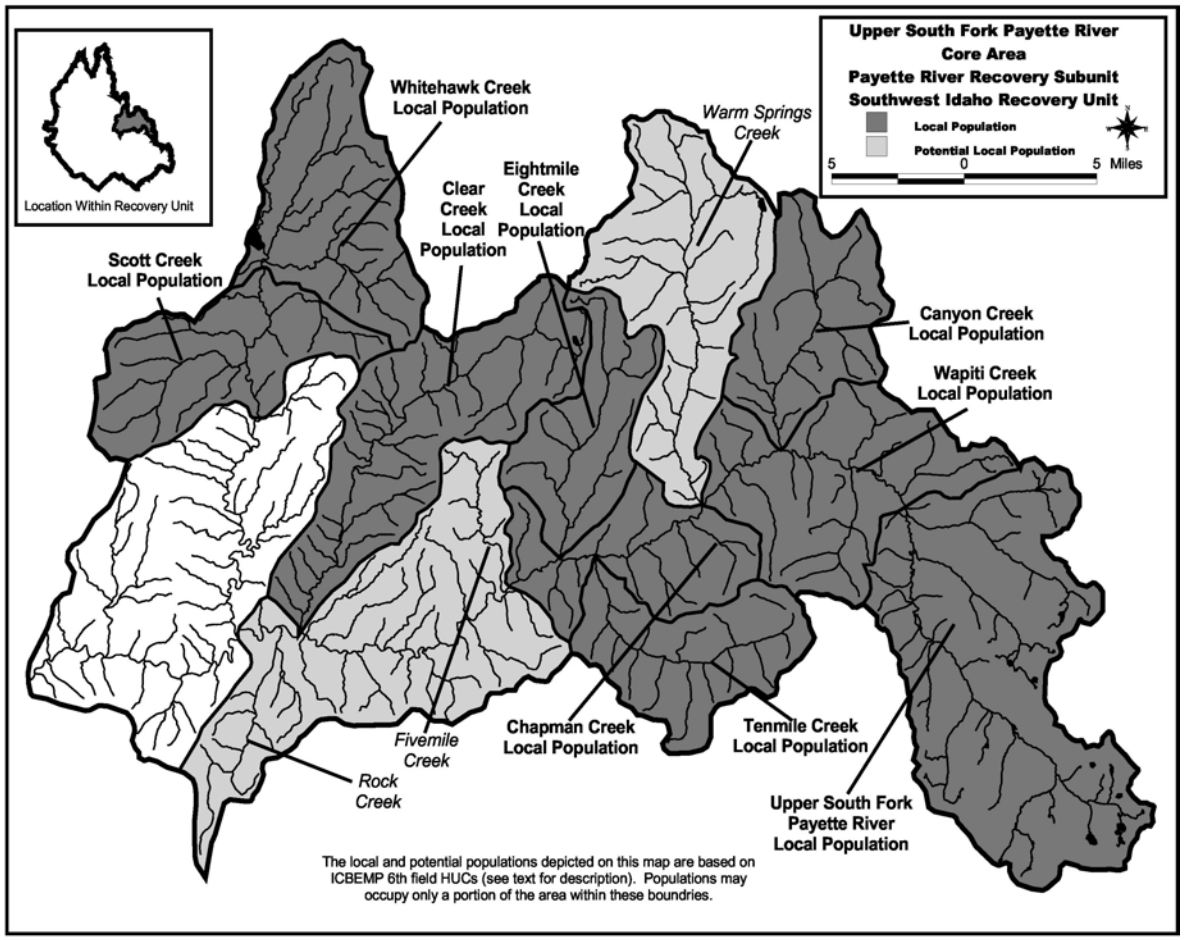


Figure 8. Deadwood River Core Area (Payette River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

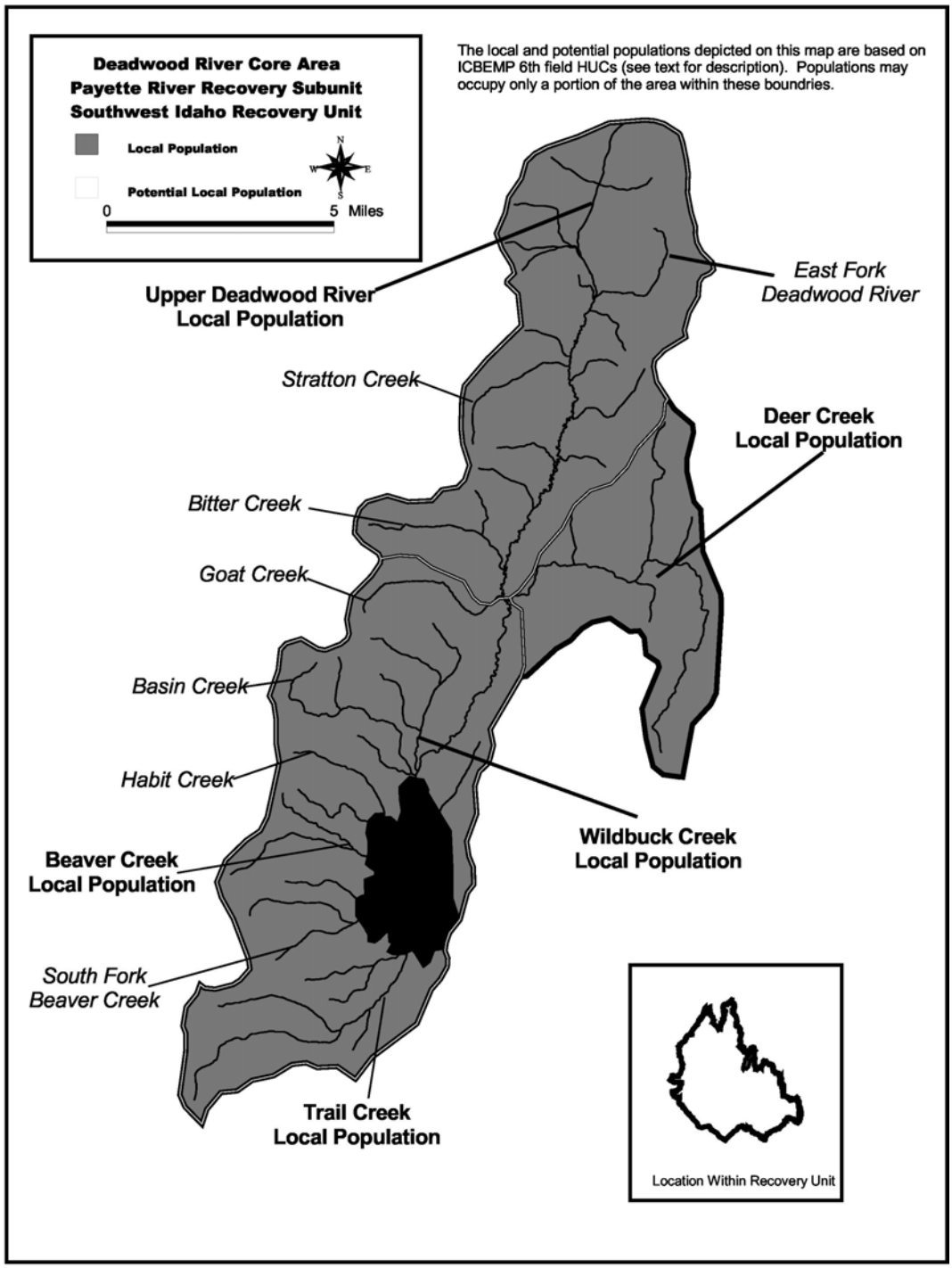


Figure 9. Middle Fork Payette River Core Area (Payette River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

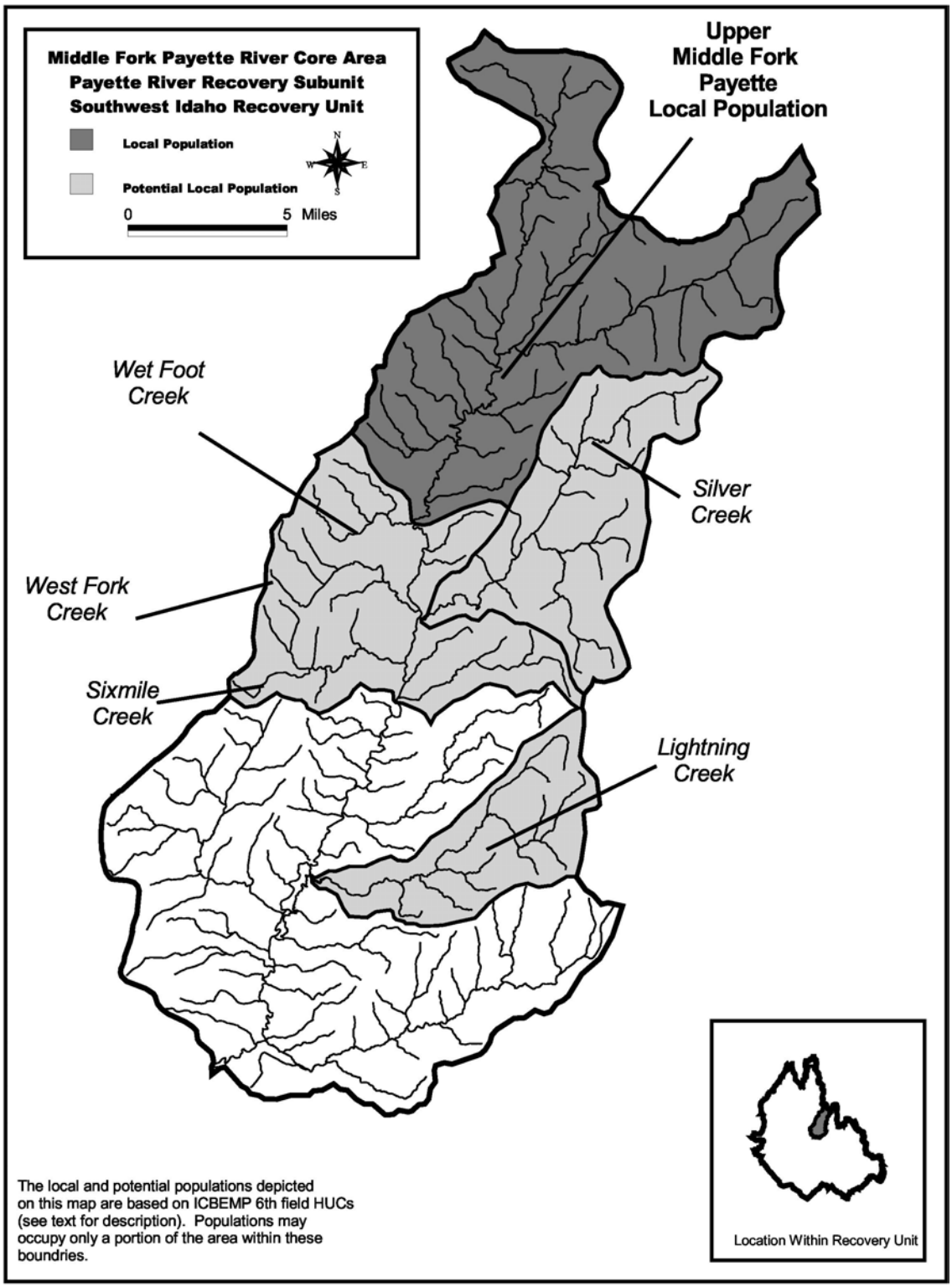


Figure 10. North Fork Payette River Core Area (Payette River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

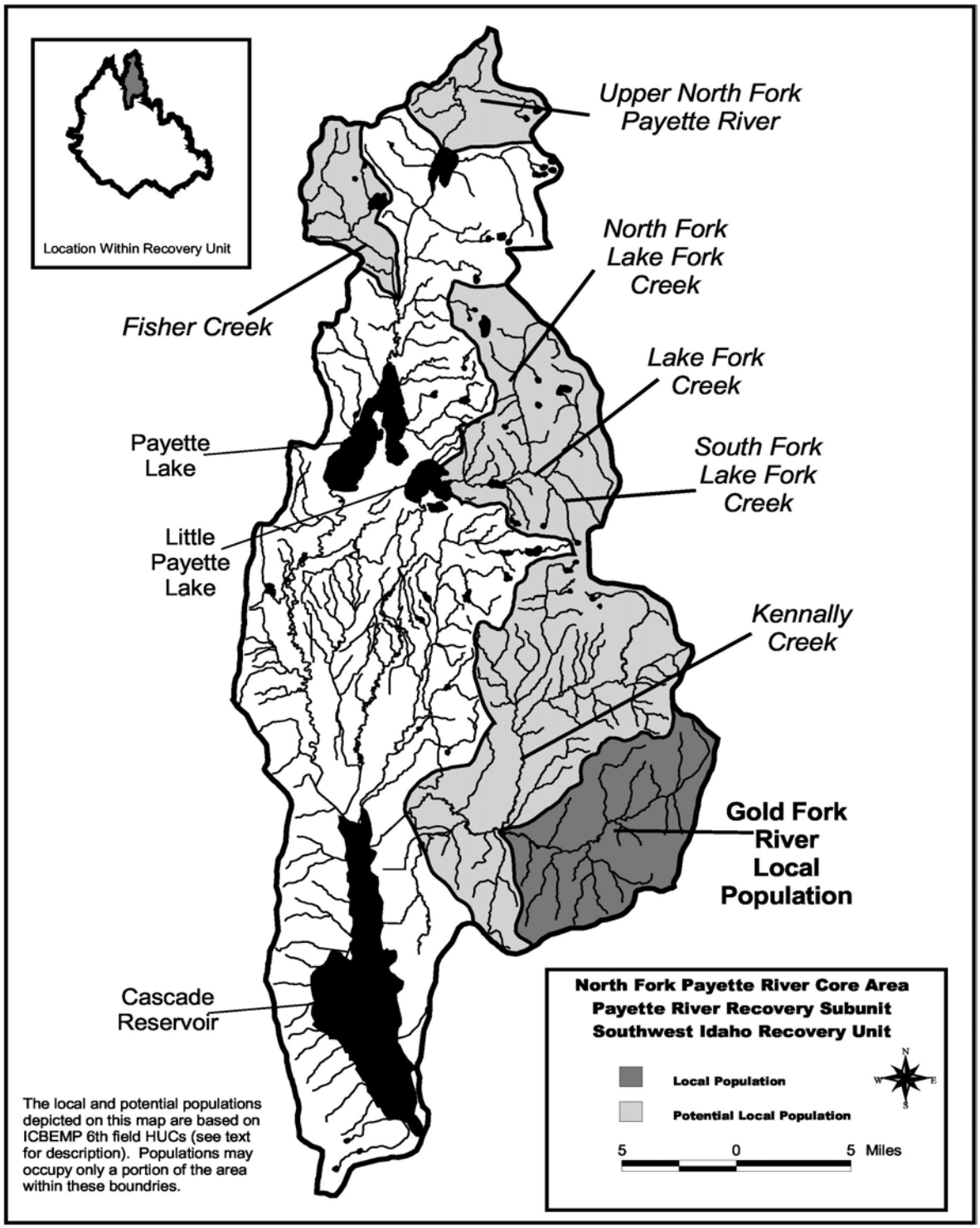


Figure 11. Squaw Creek Core Area (Payette River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).

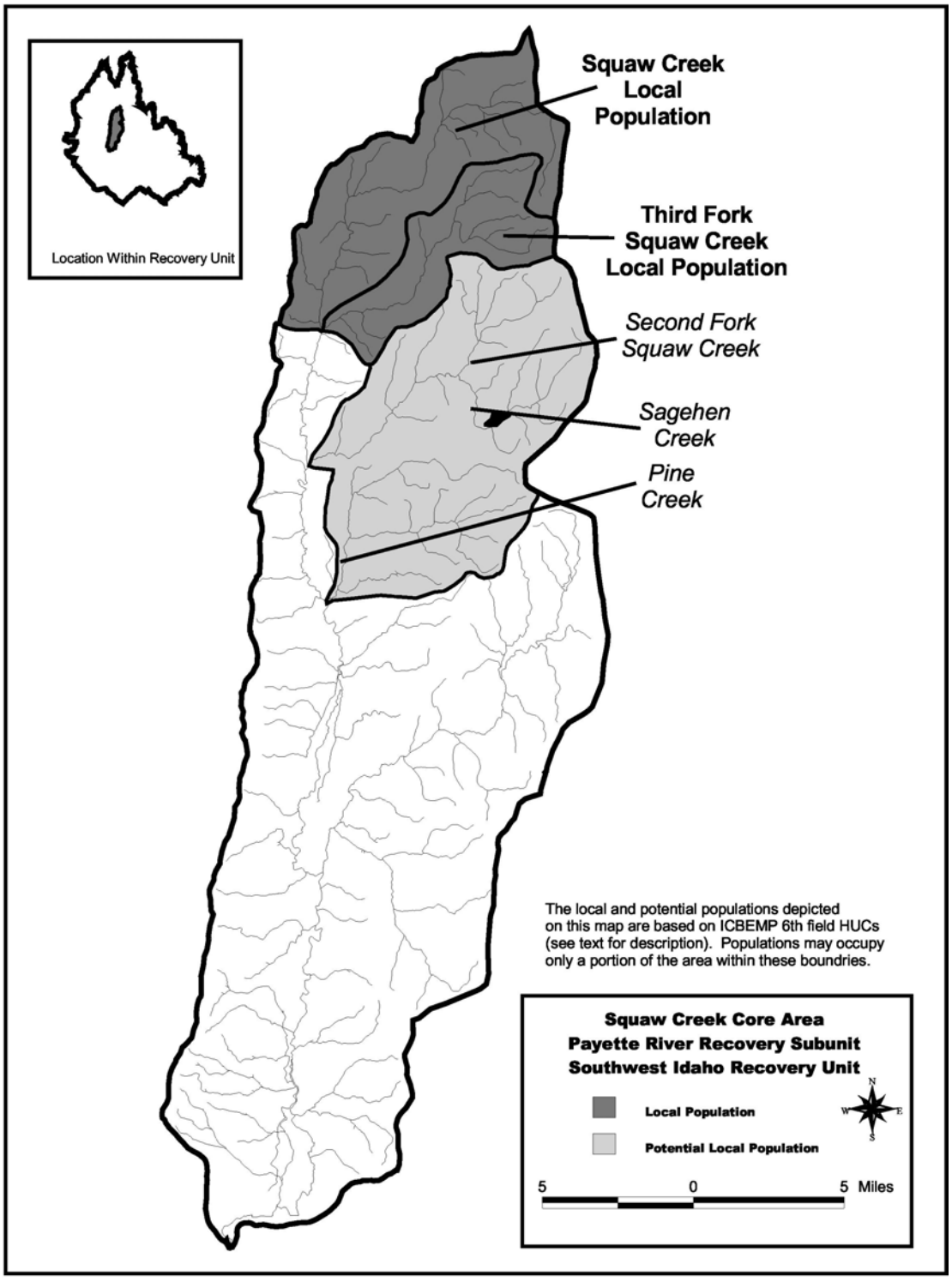


Figure 12. Weiser River Recovery Subunit showing the location of the Weiser River Core Area (see Table 4).

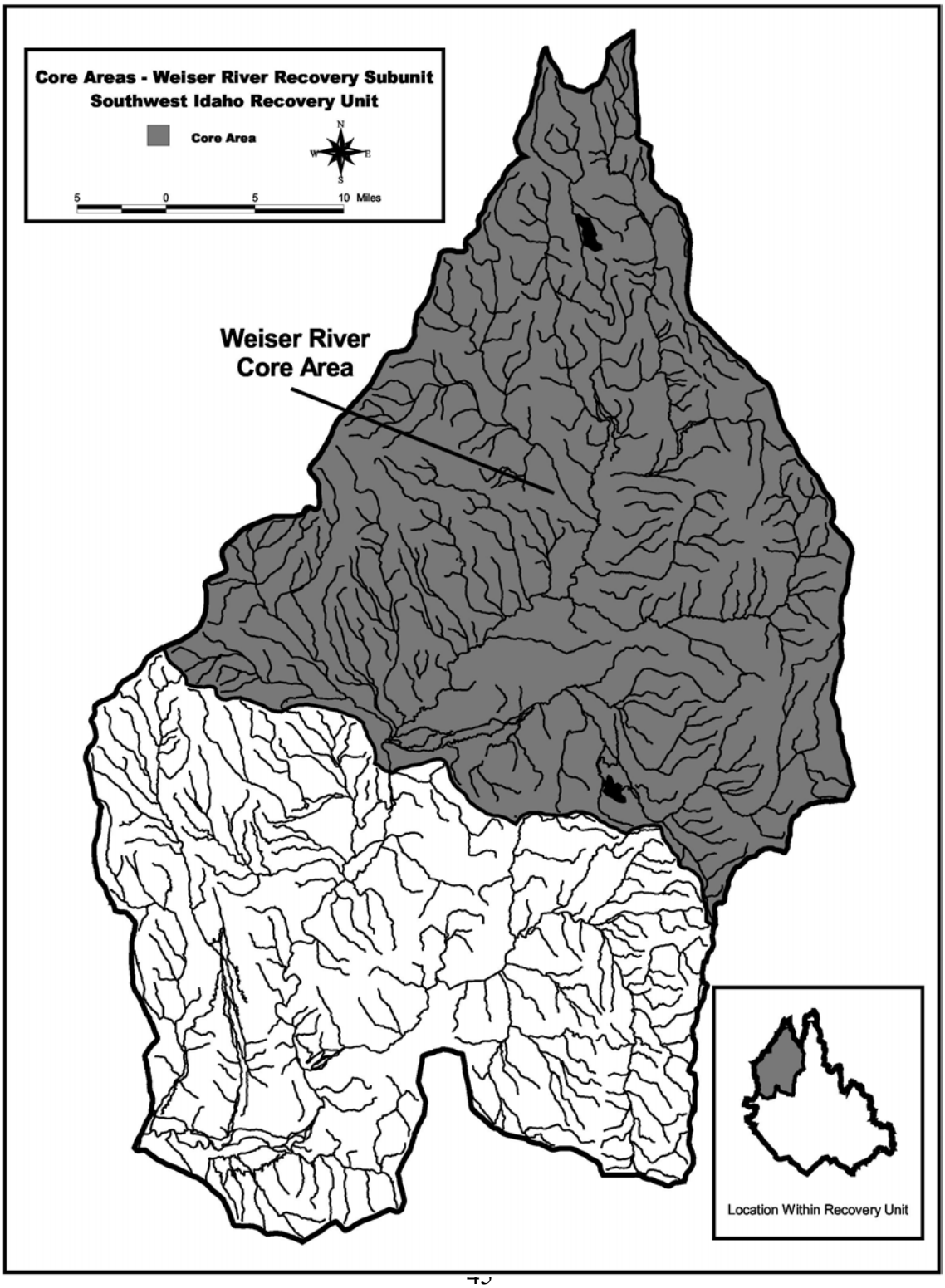
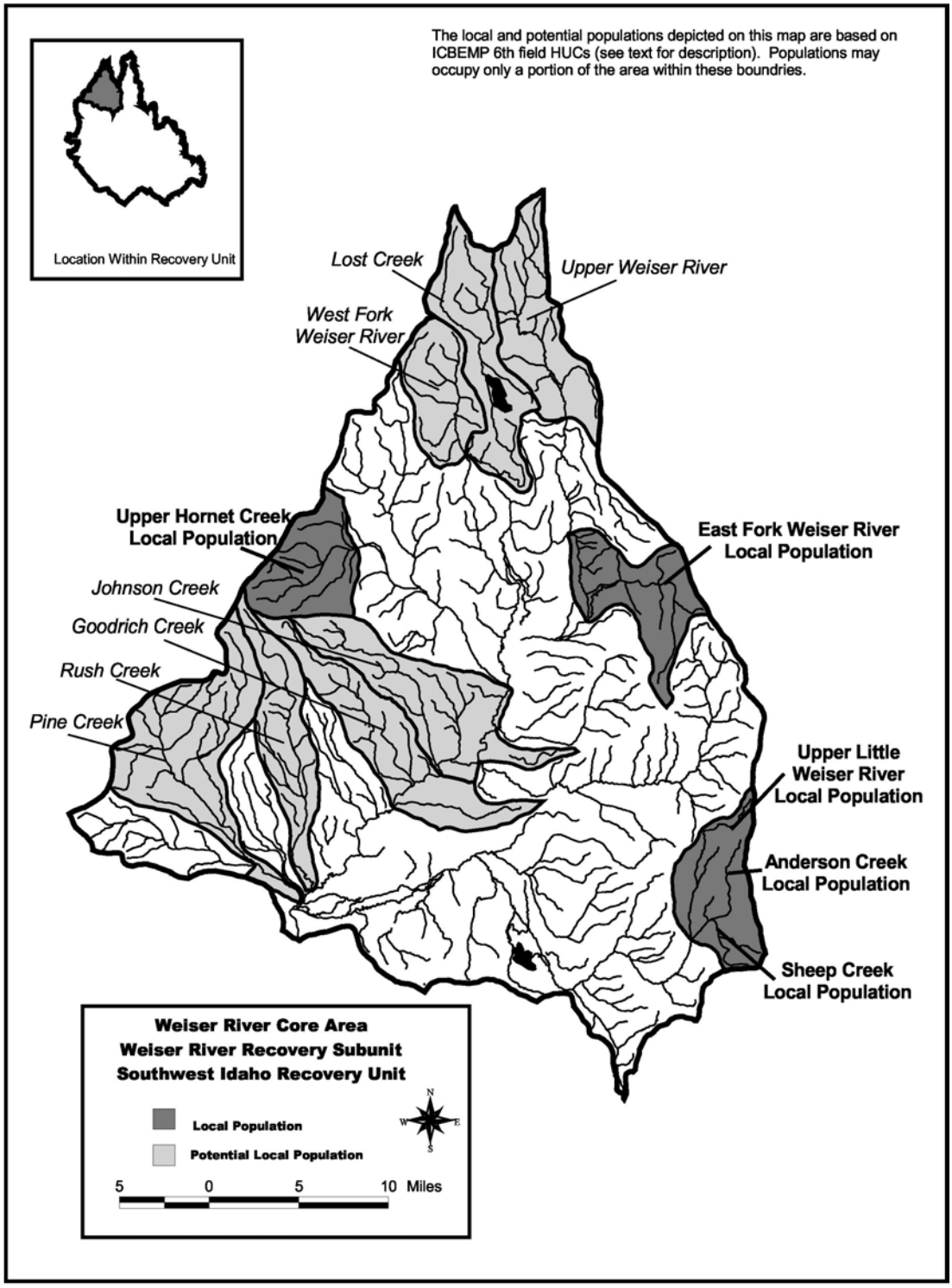


Figure 13. Weiser River Creek Core Area (Weiser River Recovery Subunit) showing the locations of local populations and areas with potential spawning and rearing habitat (see Table 4).



Recovery Goals and Objectives

The goal of the bull trout recovery plan is to **ensure the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed throughout the species' native range, so that the species can be delisted.** To achieve this goal the following objectives have been identified for bull trout in the Southwestern Idaho Recovery Unit:

- Maintain current distribution of bull trout and restore distribution in previously occupied areas within the Southwest Idaho Recovery Unit.
- Maintain stable or increasing trends in abundance of bull trout.
- Restore and maintain suitable habitat conditions for all bull trout life history stages and strategies.
- Conserve genetic diversity and provide opportunity for genetic exchange.

Rieman and McIntyre (1993) and Rieman and Allendorf (2001) evaluated the bull trout population numbers and habitat thresholds necessary for long-term viability of the species. They identified four elements, and the characteristics of those elements, to consider when evaluating the viability of bull trout populations. These four elements are 1) number of local populations; 2) adult abundance (defined as the number of spawning fish present in a core area in a given year); 3) productivity, or the reproductive rate of the population (as measured by population trend and variability); and 4) connectivity (as represented by the migratory life history form and functional habitat). For each element, the Southwest Idaho Recovery Unit Team classified bull trout into relative risk categories based on the best available data and the professional judgment of the team.

The Southwest Idaho Recovery Unit Team also evaluated each element under a potential recovered condition to produce recovery criteria. Evaluation of these elements under a recovered condition assumed that actions identified within this chapter had been implemented. Recovery criteria for the Southwest Idaho Recovery Unit reflect 1) the stated objectives for the recovery unit, 2) evaluation of each population element in both current and recovered conditions, and 3) consideration of current and recovered habitat characteristics within the recovery unit. Recovery criteria will probably be revised in the future as more detailed information on bull trout population dynamics becomes available. Given the limited information on bull trout, both the level of adult abundance and the number of local populations needed to lessen the risk of extinction should be viewed as a best estimate.

This approach to developing recovery criteria acknowledges that the status of populations in some core areas may remain short of ideals described by conservation biology theory. Some core areas may be limited by natural attributes or by patch size and may always remain at a relatively high risk of extinction. Because of limited data within the Southwest Idaho Recovery Unit, the Recovery Unit Team relied heavily on the professional judgment of its members.

Local Populations. Metapopulation theory is important to consider in bull trout recovery. A metapopulation is an interacting network of local populations with varying frequencies of migration and gene flow among them (Meffe and Carroll 1994) (see Chapter 1). Multiple local populations distributed and interconnected throughout a watershed provide a mechanism for spreading risk from stochastic events. In part, distribution of local populations in such a manner is an indicator of a functioning core area. Based in part on guidance from Rieman and McIntyre (1993), bull trout core areas with fewer than 5 local populations are at increased risk, core areas with between 5 and 10 local populations are at intermediate risk, and core areas with more than 10 interconnected local populations are at diminished risk.

For the Arrowrock Core Area, there are currently 15 known local populations; for the Anderson Ranch Core Area, there are 13 known local populations. Based on the above guidance, bull trout in the these two core areas are at a diminished risk. For the Upper South Fork Payette River Core Area, there are currently nine known local populations; for the Deadwood River Core Area, there are five known local populations. Based on the above guidance, bull trout in the these two core areas are at an intermediate risk category. For the South Fork Payette River Core Area, Squaw Creek Core Area, and Weiser Core Area there are currently two known local populations in each core area; for the North Fork Payette River Core Area and Lucky Peak Core Area there is currently one known local population in each core area. Based on the above guidance, bull trout in the these five core areas are at an increased risk category.

Adult Abundance. The recovered abundance levels in the Southwest Idaho Recovery Unit were determined by considering theoretical estimates of effective population size, historical census information, and the professional judgment of recovery team members. In general, effective population size is a theoretical concept that allows us to predict potential future losses of genetic variation within a population due to small population sizes and genetic drift (see Chapter 1). For the purpose of recovery planning, effective population size is the number of adult bull trout that successfully spawn annually. Based on standardized theoretical equations (Crow and Kimura 1970), guidelines have been established for maintaining minimum effective population sizes for conservation purposes. Effective population sizes of greater than 50 adults are necessary to prevent inbreeding depression and a potential decrease in

viability or reproductive fitness of a population (Franklin 1980). To minimize the loss of genetic variation due to genetic drift and to maintain constant genetic variance within a population, an effective population size of at least 500 is recommended (Franklin 1980; Soule 1980; Lande 1988). Effective population sizes required to maintain long-term genetic variation that can serve as a reservoir for future adaptations in response to natural selection and changing environmental conditions are discussed in Chapter 1 of the recovery plan.

For bull trout, Rieman and Allendorf (2001) estimated that a minimum number of 50 to 100 spawners per year is needed to minimize potential inbreeding effects within local populations. In addition, a population size of between 500 and 1,000 adults in a core area is needed to minimize the deleterious effects of genetic variation from drift.

For the purposes of bull trout recovery planning, abundance levels were conservatively evaluated at the local population and core area levels. Local populations containing fewer than 100 spawning adults per year were classified as at risk from inbreeding depression. Bull trout core areas containing fewer than 1,000 spawning adults per year were classified as at risk from genetic drift.

Productivity. A stable or increasing population is a key criterion for recovery under the requirements of the Endangered Species Act. Measures of the trend of a population (the tendency to increase, decrease, or remain stable) include population growth rate or productivity. Estimates of population growth rate (*i.e.*, productivity over the entire life cycle) that indicate a population is consistently failing to replace itself also indicate an increased risk of extinction. Therefore, the reproductive rate should indicate that the population is replacing itself, or growing.

Since estimates of the total population size are rarely available, the productivity or population growth rate is usually estimated from temporal trends in indices of abundance at a particular life stage. For example, redd counts are often used as an index of a spawning adult population. The direction and magnitude of a trend in the index can be used as a surrogate for the growth rate of the entire population. For instance, a downward trend in an abundance indicator may signal the need for increased protection, regardless of the actual size of the population. A population that is below recovered abundance levels, but that is moving toward recovery, would be expected to exhibit an increasing trend in the indicator.

The population growth rate is an indicator of probability of extinction. This probability cannot be measured directly, but it can be estimated as the consequence of the population growth rate and the variability in that rate. For a population to be considered viable, its natural productivity should be sufficient for the population to

replace itself from generation to generation. Evaluations of population status will also have to take into account uncertainty in estimates of population growth rate or productivity. For a population to contribute to recovery, its growth rate must indicate that the population is stable or increasing for a period of time. Based on the depressed, likely declining population trend and loss of range within the basin, or the lack of adequate population trend data, bull trout in all core areas within the Southwest Idaho Recovery Unit are currently at increased risk.

Connectivity. The presence of the migratory life history form within the Southwestern Idaho Recovery Unit was used as an indicator of the functional connectivity of the recovery unit and both core areas. If the migratory life form was absent, or if the migratory form is present but local populations lack connectivity, the core area was considered to be at increased risk. If the migratory life form persists in at least some local populations, with partial ability to connect with other local populations, the core area was judged to be at intermediate risk. Finally, if the migratory life form was present in all or nearly all local populations, and had the ability to connect with other local populations, the core area was considered to be at diminished risk.

Migratory bull are present in all or nearly all local populations with the ability to connect with other local populations in the Arrowrock, Anderson, and Middle Fork Payette river core areas and therefore are considered at diminishing risk. Migratory bull trout may persist in some local populations in the Upper South Fork Payette River, Deadwood River, Squaw Creek, and Weiser River core areas and therefore are considered at an intermediate risk. Migratory forms in the North Fork Payette River and Lucky Peak core areas are believed to be absent or extremely limited in their respective single local populations and therefore are considered at increasing risk.

Recovery Criteria

Recovery criteria for the Southwest Idaho Recovery Unit are summarized in Table 5 and include:

1. **Maintain current distribution of bull trout in the 54 local populations identified, and expand distribution by establishing bull trout local populations in areas identified as potential spawning and rearing habitat**. The number of existing local populations by recovery subunit and core area are: Boise River Recovery Subunit, 31 existing local populations (15 in Arrowrock Core Area, 17 in Anderson Ranch Core Area, and 1 in Lucky Peak Core Area); Payette River Recovery Subunit, 18 existing local populations (9 in upper South Fork Payette River Core Area, 5 in Deadwood River Core Area, 1 in Middle Fork Payette River Core Area, 1 in North Fork Payette River Core Area, 2 in

Squaw Creek Core Area); and 5 in Weiser River Recovery Subunit (this recovery subunit constitutes a single core area). Table 4 presents specific local populations and areas identified as having potential spawning and rearing habitat (*i.e.,* presently unoccupied areas that may be able to support local populations). Achieving criterion 1 entails: (1) maintaining existing local populations; (2) encouraging the establishment of additional bull trout local populations in potential spawning and rearing habitat in all core areas of the recovery unit (*e.g.,* by implementing recovery tasks to provide accesses to the areas and restoring habitat), which will contribute to achieving criteria 2 and 3; and (3) implementing activities (*i.e.,* task 5.5.3 in the Boise River Recovery Subunit, task 5.5.4 in the Payette River Recovery Subunit, and task 5.5.2 in the Weiser River Recovery Subunit) intended to evaluate the feasibility of establishing additional bull trout local populations in potential spawning and rearing habitat and then implementing activities to establish new local populations where feasible. Establishing at least one new local population each in the Lucky Peak, Middle Fork Payette River, North Fork Payette River, Squaw Creek, and Weiser River core areas is necessary to achieve criterion 1, if evaluations indicate that it is feasible in a specific core area. Tasks intended to assess the feasibility of establishing additional local populations should be conducted with coordinated review during implementation with the U.S. Fish and Wildlife Service.

2. **Estimated abundance of adult bull trout is at least 17,600 individuals in the Southwest Idaho Recovery Unit**. The recovered abundance of adult bull trout for the recovery unit was estimated based on professional judgement of the recovery unit team in consideration of surveyed fish densities, habitats, and potential fish production after threats have been addressed. (Estimates of current abundance and potential abundance of bull trout in the future include considerable uncertainty, for which measures of uncertainty are not presently available and are likely to vary among specific areas [e.g., population-specific definitions of mature bull trout, variability in sample efficiency, and appropriateness of extrapolating sample sites to larger areas.]) The recovered abundance of adult bull trout by recovery subunit and core area are: Boise River Recovery Subunit, at least 10,100 bull trout (at least 5,000 in Arrowrock Core Area, 5,000 in Anderson Ranch Core Area, 100 in Lucky Peak Core Area); Payette River Recovery Subunit, at least 7,000 bull trout (at least 5,000 in upper South Fork Payette River Core Area, 500 to 5,000 in Deadwood River Core Area, 500 to 5,000 in Middle Fork Payette River Core Area, 500 to 5,000 in North Fork Payette River Core Area, 500 to 5,000 in Squaw Creek Core Area); and at least 500 in Weiser River Recovery Subunit (500 to 5,000 in the single core area).

3. **Adult bull trout exhibit stable or increasing trends in abundance in the Southwest Idaho Recovery Unit.** The intent of this criterion is that adult bull trout in core areas presently below their recovered abundance exhibit increasing trends, whereas bull trout in core areas that may be at their recovered abundance exhibit stable trends.

4. **Specific barriers to bull trout migration in the Southwest Idaho Recovery Unit have been addressed.** Many barriers to bull trout migration exist within the recovery unit, and this recovery plan recommends several tasks to identify, assess, and reduce barriers to bull trout passage. Although achieving criteria 1 through 3 is expected to depend on providing passage at barriers (including barriers due to physical obstructions, unsuitable habitat, and water quality) throughout all core areas in the recovery unit, the intent of criterion 4 is to note specific barriers to address or tasks that must be performed to achieve recovery (*i.e.,* evaluated and appropriately addressed if found to be feasible). Activities necessary to fulfill this criterion for each recovery subunit include: continuing to provide passage (*e.g.,* using the existing trap-and-haul program) of bull trout at Arrowrock Dam (task 1.4.2) and identifying, assessing, and remedying potential passage barriers in the Lucky Peak Core Area (task 1.2.4) in the Boise River Recovery Subunit; addressing passage at the Gold Fork River irrigation diversion (task 1.2.3) and identifying, assessing, and remedying potential passage barriers in the Squaw Creek and North Fork Payette River core areas (tasks 1.2.2, 1.2.3, and 1.2.4) in the Payette River Recovery Subunit; and identifying, assessing, and remedying potential passage barriers in the Weiser River Core Area (tasks 1.2.1 and 1.2.2). Tasks intended to assess the feasibility of providing passage should be conducted with coordinated review during implementation with the U.S. Fish and Wildlife Service.

Recovery criteria for the Southwestern Idaho Recovery Unit were established to assess whether recovery actions have resulted in the recovery of bull trout. The Southwestern Idaho Recovery Unit Team expects that the recovery process will be dynamic and require refinements as more information becomes available over time. While removal of bull trout as a species under the Endangered Species Act (*i.e.*, delisting) can only occur for the entity that was listed (Columbia River Distinct Population Segment), the criteria listed above will be used to determine when the Southwestern Idaho Recovery Unit Recovery Unit is fully contributing to recovery of the population segment.

Table 5. Summary of values for recovery criteria in the Southwest Idaho Recovery Unit

Recovery subunit	Number of core areas	Minimum number of local populations	Adult abundance	Trend in abundance	Minimum number of barriers addressed[a]
Boise River	3	31	>10,100	stable or increasing	2
Payette River	5	18	>7,000	stable or increasing	3
Weiser River	1	5	>500	stable or increasing	2
Total	9	54	>17,600	stable or increasing	7

[a] Some values are the number of tasks that should be implemented; see preceding text for criterion 4.

ACTIONS NEEDED

Recovery Measures Narrative

In this chapter and all other chapters of the bull trout recovery plan, the recovery measures narrative consists of a hierarchical listing of actions that follows a standard template. The first-tier entries are identical in all chapters and represent general recovery tasks under which specific (*e.g.*, third-tier) tasks appear when appropriate. Second-tier entries also represent general recovery tasks under which specific tasks appear. Second-tier tasks that do not include specific third-tier actions are usually programmatic activities that are applicable across the species' range; they appear in *italic type*. These tasks may or may not have third-tier tasks associated with them; see Chapter 1 for more explanation. Some second-tier tasks may not be sufficiently developed to apply to the recovery unit at this time; they appear in *a shaded italic type (as seen here)*. These tasks are included to preserve consistency in numbering tasks among recovery unit chapters and intended to assist in generating information during the comment period for the draft recovery plan, a period when additional tasks may be developed. Third-tier entries are tasks specific to the Southwest Idaho Recovery Unit. They appear in the implementation schedule that follows this section and are identified by three numerals separated by periods.

The Southwestern Idaho Recovery Unit Chapter should be updated or revised as recovery tasks are accomplished, environmental conditions change, or monitoring results or other new information becomes available. Revisions to the Southwestern Idaho Recovery Unit Chapter will likely focus on priority streams or stream segments within core areas where restoration activities occurred, and habitat or bull trout populations have shown a positive response. The Southwestern Idaho Recovery Unit Team should meet annually to review annual monitoring reports and summaries, and make recommendations to the U.S. Fish and Wildlife Service.

Boise River Recovery Subunit

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Reduce sediment production from roads. Activities such as restricting road use during wet weather, improving road surfaces, removing unnecessary roads, and relocating roads out of sensitive riparian areas should be used to reduce sediment

delivery to streams. Efforts should initially focus on areas where sediments are delivered to bull trout spawning and rearing habitat and watersheds with high levels of fine sediments and road densities in riparian areas greater than or equal to 0.62 kilometer per square kilometer (1 mile per square mile). Examples of streams with these characteristics include the Beaver Creek, Edna Creek, Pikes Fork Creek, upper Trinity Creek, and streams within the Feather River drainage.

1.1.2 Evaluate and improve drainage from existing roads. Water draining from roads should be directed to slope infiltration areas and not streams to reduce sediment delivery (*e.g.,* by effective cross-drain spacing and drain dip locations). Examples of areas to initially focus efforts include the Crooked River, Beaver Creek, Edna Creek, Pikes Fork, and Fall Creek watersheds. All other watersheds in the Boise River Recovery Subunit should be evaluated and road improvements made, where necessary.

1.1.3 Assess the risk of negative effects of historic mine tailings on bull trout, and implement actions to eliminate or reduce them, if necessary. Some portions of core areas were subjected to extensive mining activities in the past. The effects of resulting mine tailings on bull trout in the recovery subunit is not known.

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Inventory culverts to identify those inhibiting fish passage, and develop a program with schedules for their replacement or modification to improve fish passage. There are over 6,000 road crossings in the Boise River Recovery Subunit. Many crossings consist of culverts that may be barriers to fish movement. Culverts acting as barriers need to be identified and remedied (*e.g.,* by using concrete box or bottomless arched culverts, bridges, or other means). The Feather River, Trinity Creek and Beaver Creek watersheds should be inventoried first, followed by the Deer Creek, Dog Creek, Nichols Creek, Big Owl Creek, Wren Creek, Trapper Creek, Trail Creek, Swanholm Creek, Hot Creek, Cottonwood Creek, and Roaring River watersheds. Improvements to culverts should be implemented according to the program's schedules. The program should prioritize culverts

within areas so that agencies can include them in their management plans to expedite corrections.

1.2.2 Evaluate bull trout use of the fish ladder at Atlanta Dam. The fish ladder at Atlanta Dam provides migratory bull trout access to about 90 kilometers (56 miles) of previously unoccupied spawning and rearing habitat (an increase of 39 percent than previously available). Bull trout were observed using the ladder after it was initially opened, however the extent that bull trout use the ladder and it has connected areas upstream and downstream of Atlanta Dam is not known. Trends in bull trout use of the ladder through time should be recorded to generate demographic information useful for evaluating biological responses.

1.2.3 Install screens on the irrigation diversions in Big Smokey and Willow creeks of the Anderson Ranch Core Area. Screens are needed to prevent fish from entering the ditches at these diversions.

1.2.4. Evaluate possible barriers to fish passage in the Mores Creek watershed and improve passage where necessary. In the Lucky Peak core area, bull trout inhabit the headwaters of Mores Creek and Lucky Peak Reservoir. Connectivity between the headwaters and reservoir is uncertain. The watershed should be surveyed for potential barriers, and approaches to providing passage developed and implemented where appropriate.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their functions.

1.3.1 Evaluate and address suction dredge mining impacts in bull trout spawning and rearing habitat. Appropriate restrictions in location (*i.e.,* spawning and rearing habitat) and timing of suction dredge activities should avoid potential negative effects to bull trout and bull trout habitat.

1.3.2 Identify areas where livestock grazing has negatively affected riparian and aquatic habitats, and implement actions to restore and improve stream and riparian habitats. For areas where grazing has affected bull trout habitat, restoration activities

should reduce sediment production, increase stream bank and stream channel stability, and contribute to the integrity of riparian vegetation. Potential actions that encourage passive restoration include fencing and modifying livestock dispersal, timing of use, and herding.

1.4 Operate dams to minimize negative effects on bull trout in reservoirs and downstream.

1.4.1 Establish conservation pools in Anderson Ranch Reservoir and Arrowrock Reservoir as per U.S. Fish and Wildlife Service (1999). Bull trout use the two reservoirs as foraging, migrating, and overwintering habitat. The reservoirs are also periodically drawn down to low levels. Conservation pools should be established to avoid potential negative effects on bull trout and their prey. Reasonable and prudent measures for establishing conservation pools are provided in U.S. Fish and Wildlife Service (1999).

1.4.2 Identify and implement operational actions and facilities necessary to prevent or reduce fish passage through dams. Make operational and structural modifications to Arrowrock Dam to prevent bull trout from passing downstream to Lucky Peak Reservoir. Evaluate the potential for bull trout to pass through Anderson Ranch Dam and implement preventative actions, if necessary. Reasonable and prudent measures for dam operations and the valve replacement project at Arrowrock Dam are provided in U.S. Fish and Wildlife Service (1999, 2001b). Because the valve replacement project has the potential to affect a major core population within the recovery subunit, it should be implemented to minimize effects on bull trout and their prey.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.

2.2 Evaluate enforcement policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Provide educational material to the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.4 Evaluate biological, economic, and social effects of control of nonnative fishes.

2.4.1 Evaluate various methods to reduce the abundance of brook trout. Throughout the range of bull trout, various projects to reduce brook trout abundance have typically had mixed results and were conducted in areas where both species occur. A variety of methods should be developed and evaluated that can be used to eradicate or substantially reduce brook trout abundance in habitats where they coexist with bull trout or where their removal would facilitate establishment of a new bull trout local population. For instance, aggressive methods can be investigated in streams where bull trout do not occur with brook trout and can encompass relatively large areas (*e.g.,* entire drainages or portions of drainages of moderate size). The biological, economic, and social feasibility of methods to reduce brook trout should be evaluated, especially in areas presently unoccupied by bull trout that are necessary for bull trout recovery (*e.g.,* potential spawning and rearing habitat).

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 Reduce competition with brook trout where they overlap with bull trout, especially in spawning and rearing habitat. From successful methods expected to be developed per task 2.4.1 (*e.g.,* physical or chemical eradication or suppression of brook trout, or habitat modifications), select appropriate methods to apply in specific streams. Efforts should initially focus on the Crooked River, Pikes Fork, Salt Creek, and Bear River watersheds.

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

3 Establish fisheries management goals and objectives compatible with bull trout recovery, and implement practices to achieve goals.

3.1 Develop and implement State and Tribal native fish management plans integrating adaptive research.

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.2.1 Continue and expand public education programs for fish identification, angling regulations, reasons for protective regulations on bull trout, and fish handling practices. Surveys have indicated that anglers' inability to correctly identify salmonids is common. Improving anglers' ability to correctly identify fishes, awareness of regulations, and fish handling will reduce incidental harvest and hooking mortality of bull trout. Educational techniques that can be used in programs include signs at popular fishing access areas, and flyers and brochures at license vendors and resource agency offices. Examples of additional locations for signs in the Arrowrock Core Area include Swanholm and Phifer creeks.

3.2.2 Continue enforcement of current fishing regulations and increase patrols. Enforcement actions should focus on areas with the greatest risk to bull trout such as popular fishing areas at Anderson Ranch and Arrowrock reservoirs and areas used seasonally by bull trout when they may be particularly vulnerable to capture (*e.g.,* spawning and staging areas, overwintering areas).

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

3.4.1 Investigate compliance with fishing regulations and opportunities to benefit bull trout. In conjunction with tasks 3.2.1 and 3.2.2, evaluate methods to improve anglers' knowledge of fishing regulations and issues affecting bull trout. Use information generated by this task to improve regulations and angler education.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Collect samples for genetic analysis to contribute to establishing a program to understand the genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1 narrative).

4.1.2 Describe and monitor genetic and phenotypic characteristics of bull trout in core areas, and incorporate information into management strategies. The interaction of bull trout genetic composition with particular environments results in phenotypic diversity and perhaps local adaptation. Such information for particular groups of bull trout and their habitats should be generated and incorporated into management strategies to improve their effectiveness.

4.2 Maintain existing opportunities for gene flow among bull trout populations.

4.2.1 Prevent the establishment of barriers that may inhibit the movement of bull trout within the Boise River Recovery Subunit. Proposed activities that might result in structural barriers or unsuitable habitat conditions for bull trout should be thoroughly evaluated. If the evaluation finds that an activity would likely create a barrier to fish movement, alternatives to the activity should be pursued if it can not be modified to allow fish passage.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.3 Conduct evaluations of the adequacy and effectiveness of current and past best management practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout, and develop and implement strategies to minimize negative effects.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.5.1 Continue studies on bull trout distribution, abundance, life histories, and factors affecting them. Several aspects of bull trout in the recovery subunit have been investigated relatively recently in the Arrowrock and Anderson Ranch core areas (*e.g.,* distribution, timing of life-history events, age distribution). The studies should be expanded to generate information to increase our knowledge of bull trout and improve recovery tasks and their effects. Examples of studies include conducting surveys to evaluate bull trout presence and potential habitat in the Grimes Creek watershed, and evaluating effects of agricultural practices on bull trout and their habitats in the Boise River Recovery Subunit.

5.5.2 Continue studies on the distribution, status, and life history of bull trout in the Mores Creek watershed. Bull trout were recently found in upper Mores Creek, a tributary to Lucky Peak Reservoir. Systematic surveys need to be conducted in the watershed to determine bull trout distribution, life history characteristics, and other information (*e.g.,* genetic composition) so that their relation to fish in other parts of the basin can be assessed.

5.5.3 Identify unoccupied areas that may be suitable for bull trout spawning and rearing in the Lucky Peak Core Area and develop a strategy to establish additional local populations. The core area presently contains one local population. Establishing additional local populations would improve the likelihood of the core population to persist and contribute to recovery. Unoccupied areas that may support bull trout spawning and rearing need to be

identified and a strategy developed to encourage the establishment of additional local populations.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.3 Enforce existing Federal, State, and Tribal habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

7 Assess the implementation of bull trout recovery by recovery units, and revise recovery unit plans based on evaluations.

7.1 Convene annual meetings of each recovery unit team to review progress on recovery plan implementation.

7.2 Assess effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

Payette River Recovery Subunit

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Reduce sediment production from roads. Use existing surveys and conduct new surveys to identify areas of sediment delivery to streams from roads. Use survey results to develop and implement sediment reduction treatments (*e.g.,* drain modifications, graveling, road closures and elimination). Focus

initially on areas where sediment delivery from roads has been documented such as specific streams in the Squaw Creek, Middle Fork Payette River, and South Fork Payette River core areas.

1.1.2 Investigate effects of sediment and potential toxic materials from Deadwood Mine on the upper Deadwood River and bull trout. The effects of Deadwood Mine on the Deadwood River and bull trout are uncertain. If negative effects are observed, develop and implement actions to correct them.

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Inventory culverts to identify those inhibiting fish passage, and develop program to improve fish passage. There are numerous culverts in the Payette River Recovery Subunit that may be inhibiting fish movement. Culverts acting as barriers need to be identified and remedied (*e.g.,* by using concrete box culverts, bridges, or other means).

1.2.2 Replace the culvert identified as a fish barrier in Second Fork Squaw Creek. The absence of bull trout in the Second Fork Squaw Creek is likely influenced by a culvert that has been identified as a fish passage barrier. The stream is also considered to have unoccupied spawning and rearing habitat, which may be suitable for an additional local population. The culvert replacement project should include an evaluation to determine the role of other factors in the stream that may affect bull trout (*e.g.,* sediment from roads, cattle grazing).

1.2.3 Identify and implement actions needed to prevent the loss of bull trout at irrigation diversions and improve fish passage. Irrigation diversions likely entrain and prevent or impair bull trout movement in various areas of the Payette River Recovery Subunit, especially in the Squaw Creek and North Fork Payette River core areas (*i.e.,* Gold Fork River). Specific actions to prevent fish loss and improve passage need to be developed and implemented.

1.2.4 Evaluate fish passage at diversions on Lake Fork and Fisher Creek and implement actions to prevent fish loss and improve passage, if necessary. In the North Fork Payette River Core

Area, bull trout were observed in Lake Fork and Fisher Creek during past surveys. More recent surveys have failed to detect bull trout; consequently, they may be in extremely low abundance or perhaps extirpated. Passage at the diversions may have influenced bull trout in these watersheds and could affect the potential for the streams to support bull trout in the future.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their functions.

1.3.1 Identify areas where livestock grazing has negatively affected riparian and aquatic habitats, and implement actions to restore and improve stream and riparian habitats. For areas where grazing has affected habitats, restoration activities should reduce sediment production, increase stream bank and stream channel stability, and contribute to the integrity of riparian vegetation. Potential actions that encourage passive restoration include fencing and modifying livestock dispersal, timing of use, and herding. For example, fences can be used to exclude livestock from sensitive areas in Squaw Creek and a rider can reduce concentrations of livestock in unfenced areas of Squaw Creek and Gold Fork River.

1.3.2 Investigate and implement methods for restoring habitat conditions in the lower Middle Fork Payette River. Potential foraging, migrating, and overwintering habitat in the lower Middle Fork Payette River has been degraded by excess sedimentation. Sediments have filled pools, increased stream width:depth ratios, and reduced habitat complexity. Investigate restoration methods (*e.g.,* road modifications, increasing riparian vegetation) that reduce sediment delivery, reduce width to depth ratios, and increase habitat complexity.

1.4 Operate dams to minimize negative effects on bull trout in reservoirs and downstream.

1.4.1 Evaluate and implement appropriate operations at Deadwood Dam to provide adequate flows and temperatures for bull trout downstream of the dam. Water released from Deadwood Reservoir may not be conducive to bull trout recovery due to inappropriate temperatures and flow regime. Dam operation

should be evaluated relative to bull trout needs and modified if necessary.

1.4.2 Establish a conservation pool in Deadwood Dam. Deadwood Dam is presently operated to maintain a winter flow of 1.4 cubic meters per second (50 cubic feet per second) and a minimum pool of about 62 million cubic meters (50,000 acre-feet). Although these operations are not believed to adversely affect bull trout inhabiting Deadwood Reservoir, they need to be evaluated relative to recovery of bull trout in both the Deadwood River and South Fork Payette River core areas.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.

2.2 Evaluate enforcement policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Provide information to the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.4 Evaluate biological, economic, and social effects of control of nonnative fishes.

2.4.1 Evaluate various methods to reduce the abundance of brook trout. Throughout the range of bull trout, various projects to reduce brook trout abundance have typically had mixed results and were conducted in areas where both species occur. A variety of methods should be developed and evaluated that can be used to eradicate or substantially reduce brook trout abundance in habitats where they coexist with bull trout or where their removal would facilitate establishment of a new bull trout local population. For instance, aggressive methods can be investigated in streams where bull trout do not occur with brook trout and can encompass relatively large areas (*e.g.,* entire drainages or portions of drainages of moderate size). The

biological, economic, and social feasibility of methods to reduce brook trout should be evaluated, especially in areas presently unoccupied by bull trout that are necessary for bull trout recovery (*e.g.,* potential spawning and rearing habitat).

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 If feasible, reduce brook trout abundance where they overlap with bull trout and in areas where bull trout may become established. In the Gold Fork River drainage, the North Fork of Kennally Creek and Rapid Creek are located in largely undisturbed and roadless areas. High densities of brook trout within these streams make it unlikely that bull trout could become established. The feasibility of reducing brook trout abundance should be evaluated in portions of these streams to investigate the possibility of establishing additional local populations of bull trout in the core area. Similar evaluations should be conducted in the Squaw Creek (*i.e.,* in the mainstem Squaw Creek and Third Fork Squaw Creek) and Middle Fork Payette River (*i.e.,* Bull Creek) core areas with the intent of improving abundance of existing local populations of bull trout.

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

3 Establish fisheries management goals and objectives compatible with bull trout recovery, and implement practices to achieve goals.

3.1 Develop and implement State and Tribal native fish management plans integrating adaptive research.

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.2.1 Continue and expand public education programs for fish identification, angling regulations, reasons for protective regulations on bull trout, and fish handling practices. Surveys have indicated that anglers' inability to correctly identify salmonids is common. Improving anglers' ability to correctly identify fishes, awareness of regulations, and fish handling will reduce incidental harvest and hooking mortality of bull trout. Educational techniques that can be used in programs include

signs at popular fishing access areas, and flyers and brochures at license vendors and resource agency offices.

3.2.2 Continue enforcement of current fishing regulations and increase patrols. Patrols should focus on popular fishing areas and areas used seasonally by bull trout when they may be particularly vulnerable to capture (*e.g.,* spawning and staging areas, overwintering areas).

3.2.3 Evaluate compliance of angling regulations and incidence of bull trout poaching in Gold Fork River from Kennally Creek upstream to the confluence of the North Fork and South Fork Gold Fork River. Because of low abundance of bull trout in the Gold Fork River, every individual is important to the population. If the evaluation indicates that poaching or incidental mortality of bull trout is substantial, close the watershed to angling until a fish identification and fishing regulation education program has been successful in reducing bull trout mortality.

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.3.1 Evaluate the effects of fish stocking and the fishery on bull trout in Deadwood Reservoir. Although Atlantic salmon and chinook salmon were stocked in Deadwood Reservoir prior to 1998 and may have preyed on bull trout, sterile rainbow trout and kokanee are the only species currently stocked. Potential effects of the fishery (*e.g.*, poaching and incidental mortality) on bull trout should be evaluated and corrective actions implemented, if necessary.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Collect samples for genetic analysis to contribute to establishing a program to understand the genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1 narrative).

4.1.2 Describe and monitor genetic and phenotypic characteristics of bull trout in core areas, and incorporate information into management strategies. The interaction of bull trout genetic composition with particular environments results in phenotypic diversity and perhaps local adaptation. Such information for particular groups of bull trout and their habitats should be generated and incorporated into management strategies to improve their effectiveness.

4.2 Maintain existing opportunities for gene flow among bull trout populations.

4.2.1 Prevent the establishment of barriers that may inhibit the movement of bull trout within the Payette River Recovery Subunit. Proposed activities that might result in structural barriers or unsuitable habitat conditions for bull trout should be thoroughly evaluated. If the evaluation finds that an activity would likely create a barrier to fish movement, alternatives to the activity should be pursued if it can not be modified to allow fish passage.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.3 Conduct evaluations of the adequacy and effectiveness of current and past Best Management Practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout, and develop and implement strategies to minimize negative effects.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.5.1 Conduct additional surveys focusing on migratory bull trout and bull trout habitat. Surveys should be completed in the Deadwood River, Middle Fork Payette River, and South Fork Payette River. Specific streams on which to focus include, Bull, Peace, Valley, upper Silver, and Long Fork Silver creeks.

5.5.2 Compile and synthesize historic information concerning bull trout presence, distribution, and abundance in the South Fork Payette River basin. Minimal information concerning bull trout in the area have been analyzed. Additional information may exist.

5.5.3 Conduct comprehensive surveys for bull trout in the upper North Fork Payette River Core Area. Bull trout were observed in Lake Fork and Fisher Creek watersheds during past surveys, but were not found during subsequent sampling in Fisher Creek. A comprehensive survey should resample sites where bull trout were observed in the past and additional sites including areas where bull trout may occur.

5.5.4 Develop a strategy to establish new local populations in unoccupied areas identified as having potential spawning and rearing habitat. The Middle Fork Payette River, North Fork Payette River, and Squaw Creek core areas each contain few local populations. Unoccupied areas identified as having potential spawning and rearing habitat need to be assessed to determine the feasibility of encouraging the establishment of additional local populations, and a strategy to establish new local populations developed.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.3 Enforce existing Federal, State, and Tribal habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

7 Assess the implementation of bull trout recovery by recovery units, and revise recovery unit plans based on evaluations.

7.1 Convene annual meetings of each recovery unit team to review progress on recovery plan implementation.

7.2 Assess effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.

Weiser River Recovery Subunit

1 Protect, restore, and maintain suitable habitat conditions for bull trout.

1.1 Maintain or improve water quality in bull trout core areas or potential core habitat.

1.1.1 Reduce sediment production from roads. Develop a comprehensive transportation management plan that identifies roads that deliver sediments to streams, and implement activities to reduce sediment delivery (*e.g.,* drainage designs, graveling, road closure and elimination).

1.2 Identify barriers or sites of entrainment for bull trout and implement tasks to provide passage and eliminate entrainment.

1.2.1 Inventory culverts to identify those inhibiting fish passage, and develop a program to improve fish passage. There are numerous culverts in the Weiser River Recovery Subunit that may be inhibiting fish movement. Culverts acting as barriers need to be identified and passage improved (*e.g.,* by using concrete box culverts, bridges, or other means).

1.2.2 Identify facilities and actions needed to prevent the loss of bull trout at irrigation diversions. Irrigation diversions are thought to entrain and prevent or impair bull trout movement in several areas of the Weiser River Recovery Subunit, especially in potential foraging, migrating, and overwintering habitat. Specific actions to prevent fish loss and improve passage need to be developed and implemented.

1.3 Identify impaired stream channel and riparian areas and implement tasks to restore their functions.

1.3.1 Identify areas where livestock grazing has negatively affected riparian and aquatic habitats, and implement actions to restore and improve stream and riparian habitats. For areas where grazing has affected habitats, restoration activities should reduce sediment production, increase stream bank and stream channel stability, and contribute to the integrity of riparian vegetation. Potential actions include fencing and others that address livestock dispersal, timing of use, and herding.

1.4 Operate dams to minimize negative effects on bull trout in reservoirs and downstream.

1.5 Identify upland conditions negatively affecting bull trout habitats and implement tasks to restore appropriate functions.

2 Prevent and reduce negative effects of nonnative fishes and other nonnative taxa on bull trout.

2.1 Develop, implement, and enforce public and private fish stocking policies to reduce stocking of nonnative fishes that affect bull trout.

2.2 Evaluate enforcement policies for preventing illegal transport and introduction of nonnative fishes.

2.3 Provide information to the public about ecosystem concerns of illegal introductions of nonnative fishes.

2.4 Evaluate biological, economic, and social effects of control of nonnative fishes.

2.4.1 Evaluate various methods to reduce the abundance of brook trout. Throughout the range of bull trout, various projects to reduce brook trout abundance have typically had mixed results and were conducted in areas where both species occur. A variety of methods should be developed and evaluated that can be used to eradicate or substantially reduce brook trout abundance in habitats where they coexist with bull trout or where their removal would facilitate establishment of a new bull trout local population. For instance, aggressive methods can be investigated in streams where bull trout do not occur with brook trout and can encompass relatively large areas (*e.g.,* entire drainages or portions of drainages of moderate size). The biological, economic, and social feasibility of methods to reduce brook trout should be evaluated, especially in areas presently unoccupied by bull trout that are necessary for bull trout recovery (*e.g.,* potential spawning and rearing habitat).

2.5 Implement control of nonnative fishes where found to be feasible and appropriate.

2.5.1 Conduct surveys to determine the distribution of brook trout in the Weiser River Recovery Subunit. Although brook trout occur with bull trout in some streams (*e.g.,* upper Weiser River, Dewey Creek, and East Fork Weiser River), brook trout distribution and abundance is not well known throughout the recovery subunit.

2.5.2 Conduct a study on the feasibility of reducing brook trout abundance where they overlap with bull trout and in areas where bull trout may become reestablished. Brook trout occur with bull trout in some streams (*e.g.,* upper Weiser River, Dewey Creek, and East Fork Weiser River), and approaches to reduce brook trout abundance should be evaluated.

2.6 Develop tasks to reduce negative effects of nonnative taxa on bull trout.

3 Establish fisheries management goals and objectives compatible with bull trout recovery, and implement practices to achieve goals.

3.1 Develop and implement State and Tribal native fish management plans integrating adaptive research.

3.2 Evaluate and prevent overharvest and incidental angling mortality of bull trout.

3.3 Evaluate potential effects of introduced fishes and associated sport fisheries on bull trout recovery and implement tasks to minimize negative effects on bull trout.

3.3.1 Evaluate the effects of fish stocking and the fisheries on bull trout. Sterile rainbow trout are currently stocked in the Weiser River. Potential effects of the fishery (*e.g.,* poaching and incidental mortality) on bull trout should be evaluated and corrective actions implemented, if necessary.

3.4 Evaluate effects of existing and proposed sport fishing regulations on bull trout.

4 Characterize, conserve, and monitor genetic diversity and gene flow among local populations of bull trout.

4.1 Incorporate conservation of genetic and phenotypic attributes of bull trout into recovery and management plans.

4.1.1 Collect samples for genetic analysis to contribute to establishing a program to understand the genetic baseline and monitor genetic changes throughout the range of bull trout (see Chapter 1 narrative).

4.1.2 Describe and monitor genetic and phenotypic characteristics of bull trout in core areas, and incorporate information into management strategies. The interaction of bull trout genetic composition with particular environments results in phenotypic diversity and perhaps local adaptation. Such information for particular groups of bull trout and their habitats should be generated and incorporated into management strategies to improve their effectiveness.

4.2 Maintain existing opportunities for gene flow among bull trout populations.

4.2.1 Prevent the establishment of barriers that may inhibit the movement of bull trout within the Weiser River Recovery

Subunit. Proposed activities that might result in structural barriers or unsuitable habitat conditions for bull trout should be thoroughly evaluated. If the evaluation finds that an activity would likely create a barrier to fish movement, alternatives to the activity should be pursued if it can not be modified to allow fish passage.

4.3 Develop genetic management plans and guidelines for appropriate use of transplantation and artificial propagation.

5 Conduct research and monitoring to implement and evaluate bull trout recovery activities, consistent with an adaptive management approach using feedback from implemented, site-specific recovery tasks.

5.1 Design and implement a standardized monitoring program to assess the effectiveness of recovery efforts affecting bull trout and their habitats.

5.2 Conduct research evaluating relationships among bull trout distribution and abundance, bull trout habitat, and recovery tasks.

5.3 Conduct evaluations of the adequacy and effectiveness of current and past Best Management Practices in maintaining or achieving habitat conditions conducive to bull trout recovery.

5.4 Evaluate effects of diseases and parasites on bull trout, and develop and implement strategies to minimize negative effects.

5.5 Develop and conduct research and monitoring studies to improve information concerning the distribution and status of bull trout.

5.5.1 Continue surveys to refine information on bull trout distribution, abundance, life histories, and habitats. Studies should be conducted to generate information to expand our knowledge of bull trout and improve recovery tasks and their effects in the Weiser River Recovery Subunit.

5.5.2 Develop a strategy to establish new local populations in unoccupied areas identified as having potential spawning and rearing habitat. The Weiser River Core Area contains relatively few local populations. Unoccupied areas identified as having potential spawning and rearing habitat need to be assessed to determine the feasibility of encouraging the establishment of

additional local populations, and a strategy to establish new local populations developed.

5.6 Identify evaluations needed to improve understanding of relationships among genetic characteristics, phenotypic traits, and local populations of bull trout.

6 Use all available conservation programs and regulations to protect and conserve bull trout and bull trout habitats.

6.1 Use partnerships and collaborative processes to protect, maintain, and restore functioning core areas for bull trout.

6.2 Use existing Federal authorities to conserve and restore bull trout.

6.3 Enforce existing Federal, State, and Tribal habitat protection standards and regulations and evaluate their effectiveness for bull trout conservation.

7 Assess the implementation of bull trout recovery by recovery units, and revise recovery unit plans based on evaluations.

7.1 Convene annual meetings of each recovery unit team to review progress on recovery plan implementation.

7.2 Assess effectiveness of recovery efforts.

7.3 Revise scope of recovery as suggested by new information.